

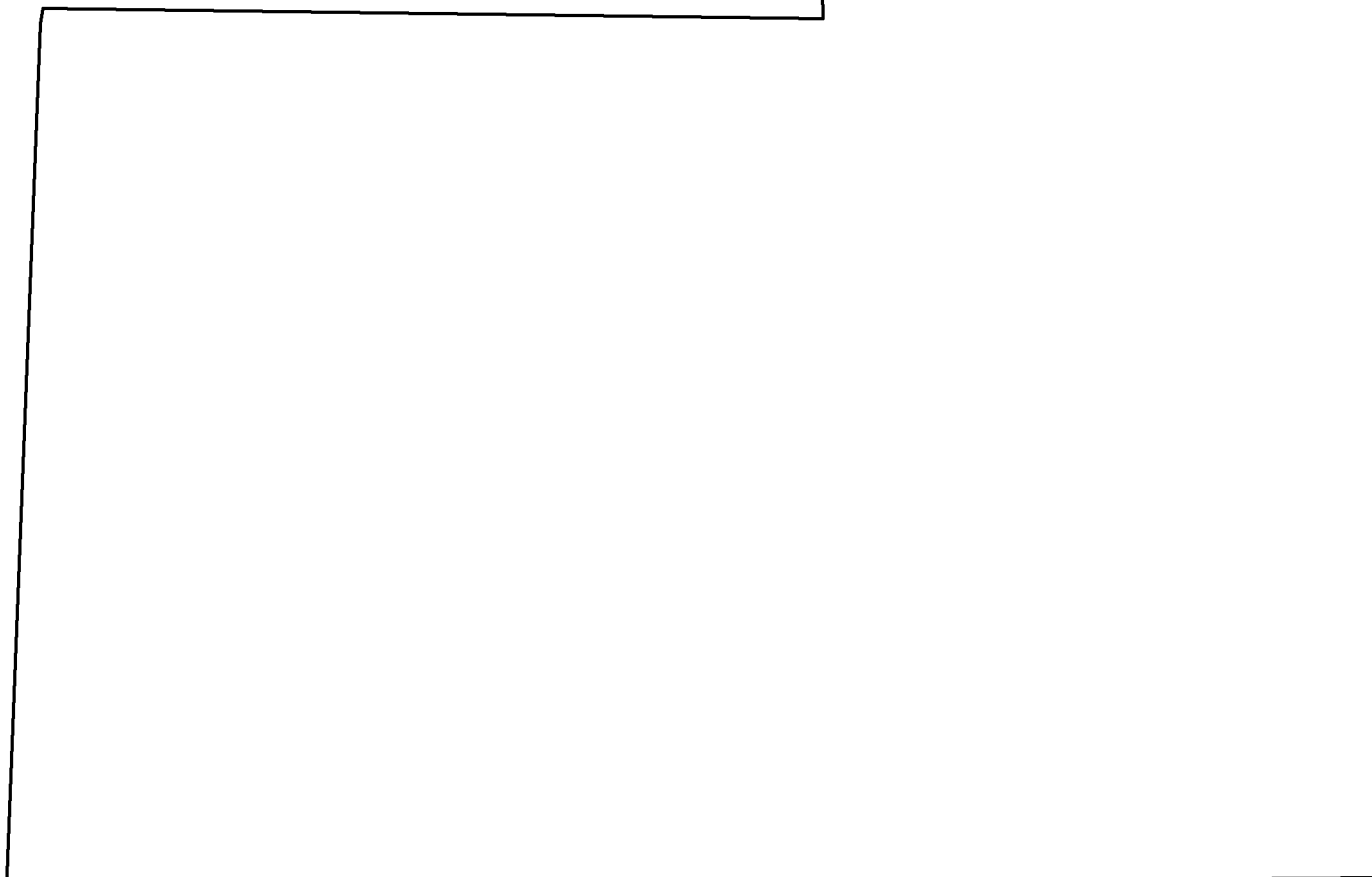
NRO REVIEW
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15 February 1968

Copy No. 3

MEMORANDUM FOR: Chief, Technical Services and Support Group, NPIC

SUBJECT: J-3 Bi-Color Evaluation Requirement

- REFERENCES:
- A. Cable IN-28017, Dated 17 January 1968, Cite [redacted] Subject: Bi-Spectral Material Analysis
 - B. [redacted] Memorandum for Tech Adv/DIR/NPIC, Dated 13 April 1967, [redacted]
 - C. Cable IN-29440, Dated 8 February 1968, Cite [redacted] Subject: Bi-Color CORONA Photo Experiment Viewers

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1. The subject requirement has been reviewed in detail with [redacted] the Technical Services Division. An outline of the major aspects of the requirement follows in order of significance.

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2. Critical Point: This information is required well in advance of the next KH-4 mission launch which is scheduled [redacted] Intelligence analysts at Headquarters and DD/S&T representative [redacted] are interested in continuing the evaluation of bi-color techniques in the J-3 system. This involves the introduction of a special filter on one of the cameras during the time that the bi-color experimental acquisition is taking place. This would typically be on an engineering basis [redacted] However, there are possible specific requirements from Headquarters Intelligence Analysts for one or two passes over selected Soviet Bloc targets to also utilize the bi-color mode. The critical question is what would be the impact on the intelligence value of the remainder of the mission if the mechanism which is withdrawing this special filter failed and a large portion of the mission was taken in the bi-color mode unintentionally.

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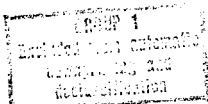
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3. Specific Requirements: By Reference A, a requirement was laid on NPIC/TSSG/TSD to perform analysis of the bi-spectral material acquired in J-3 Mission [redacted] This analysis required that the bi-spectral materials be compared to determine the differences, if any, in the following general areas:

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- a. Image quality.
- b. Shadow and highlight detail.
- c. Overall contrast and tonal range.
- d. Information content.

It is understood that this requirement could best be summarized by the statement that a quantitative determination of the degradation of information content available for exploitation in the normal black-and-white mode caused by the bi-spectral acquisition system is required. A secondary implicit requirement is to determine what benefits, if any, can be identified by various analytical exploitation techniques available with the bi-spectral materials.

4. Source of Requirement: The specific requirement referred to in Reference A has been laid on by the AP Facility [REDACTED]. The general requirement to evaluate bi-color has been a matter of discussion and study by the KH-4B Ad Hoc Committee since about April 1967. As cited in Reference B, which indicates that a project would be set up in the [REDACTED] program for evaluating this material when acquired by a modified [REDACTED] camera system, the results of this test were reported in [REDACTED] Report No. 16, dated 15 September 1967. The progress of this testing and the approximate schedule of the J-3 mission test were made known to NPIC components through meetings of the Multisensor Working Group. This requirement is typical of those laid on by such ad hoc collection system committees and those routinely handled by the TSD.

5. Size of the Job: The bi-spectral material flown on the J-3 mission [REDACTED] involved seven [REDACTED] and one operational pass. The microdensitometric analysis of representative samples of these materials has been essentially completed and has involved approximately 140 man hours of TSD personnel. TSD has made arrangements with [REDACTED] of PAG to furnish about 16 man hours of P.I. time for subjective evaluation of the degradation of these materials for the conventional black-and-white exploitation mode. Relatively little work has been done in the evaluation of the material for bi-spectral analysis. A few positive transparencies have been made available for rectification at ACIC and superimposition printing at [REDACTED]. Due to the distortion of these materials and the requirement for precisely registered superimposition viewing, there are relatively few options for displaying this material in the color presentation mode. There is no known equipment suitable for this purpose on a real-time basis other than the ARES viewer modified for this purpose which is available at RADC.

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[redacted] DD/S&T [redacted] appear to be convinced that the use of this device is called for in the evaluation of the viewing of this material. By Reference C, [redacted] has made arrangements for this equipment to be made available to NPIC and to be delivered and returned without cost to the Agency. TSD personnel are prepared to evaluate this material on the modified ARES viewer and have made arrangements for P.I. support. They estimate an additional 260 man-hours will be required for this phase of the evaluation.

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6. Schedule: TSD believes they will be prepared to issue a cable report concerning the degradation of the black-and-white materials during the week of 18 - 24 February 1968. They estimate that they will be able to deliver a cable report concerning the color viewing mode within a month after the viewing equipment is delivered and brought to an operational status. They plan to include a more detailed special study report with the photo evaluation report of the next mission.

7. Coordination: This project has received thorough coordination within the community through the Ad Hoc Committee. There has been information coordination with NPIC through several briefings which were held in the Auditorium, the Multisensor Working Group, distribution of related cables, and individual personal contacts made by TSD representatives. As is typical in such acquisition system evaluation projects, TSD has been the primary point for coordination, project planning, and action concerning this requirement.

8. Discussion:

a. This requirement is apparently of considerable significance to the Ad Hoc Committee. More important, it is apparently of considerable significance to Headquarters intelligence analysts [redacted] one of the targets for which they have requested (bi-spectral acquisition) and members of DD/S&T/OSP [redacted] It is understood that the latter are primarily responsible for accomplishing the acquisition of the J-3 test materials and are most concerned with the decision regarding the acquisition of similar materials on the next J-3 mission.

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b. There is in existence a functioning quick response network involving the commercial and government organizations related to the acquisition and exploitation of satellite materials which act as the controlling force for determining the characteristics of these acquisition systems. For many years, TSD has been the primary NPIC component in this network. They have procedures for coordination of analytical, operational, and reproduction inputs as they relate to the acquisition system configuration.

c. Recommendations such as those arising from an evaluation of this type are of extreme importance to the Center. They are related to the Center position on fundamental acquisition requirements. These evaluations are currently performed in an efficient, if somewhat constrained, manner which is dictated by the short time frames allowed for their accomplishment. The question remains as to whether more extensive work involving higher management and broader analytical effort is justified when these requirements pass a certain threshold of significance.

d. Members of the TDS including myself have had considerable experience with the ARES viewer. As you know, the development of the EROS and the Automatic Stereo Scanner was based on the fundamental technology incorporated in the ARES. There are some limitations to the ARES which may significantly handicap the visual evaluation of the bi-spectral material. The primary limitation would be in resolution. At best the equipment is capable of about 40 lines at the plane of the input material. Under the circumstances of the superimposition of images, I would suspect this performance is cut by at least a factor of two. Our experience in the past has indicated that no matter how dramatic image enhancement techniques may appear, significant loss in resolution quickly prejudices the evaluator against the system. However, there is no known alternative to the ARES and there are specific requests for TSD to utilize this equipment by DD/S&T

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e. There are other technical inputs which may be significant to such an evaluation project which for lack of time and established procedures have not been utilized. These include inputs from the image analysis program and guidance from the various human factors scientists who are available from the Development and Engineering Division. Since one of TSD's prime functions is image analysis, the most significant missing factor in the current evaluation project is in the human factors area.

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f. The interest of Headquarters intelligence analysts and DD/S&T members in the Bi-Color system implies that the color issue is not settled and there are considerable probabilities that some form of color system may become operational in the near future. The directions for the present planning and programming of the Center's R&D effort has specifically excluded any provisions for exploitation of color acquisition materials.

9. Recommendations:

a. That the present projects being performed by TSD on the evaluation of the J-3 Mission [] bi-spectral materials be accomplished according to their existing plan and schedule. (this includes the immediate acquisition of the ARES viewer), with the exception [] be requested to observe and evaluate the procedures and obtaining photo interpreter response to the bi-spectral materials.

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b. That the Chief of TSSG consider the existing procedures for accomplishing these evaluations and provide instructions to S&PS, TSD and other appropriate TSSG components regarding any modifications of these procedures which he deems appropriate to the new concepts upon which our current reorganization is based.

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